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THE RELATION OF PHILOSOPHY AND THE SCIENCES

By Professor G. R. WELLS

OHIO WESLEYAN UNIVERSITY

REMARKS on the relation of philosophy and the sciences are, perhaps, best made by one who is quite often supposed to belong to neither of these groups, namely, a psychologist. For as the philosopher usually views a psychologist as one just outside of the sacred pale, so do the scientists often refuse to recognize him as one of themselves. While I would not be understood as calmly accepting the status of a missing link, I do feel that there is some reason for a certain amount of confidence that the psychologist is able to view the two fields of philosophy on the one hand, and science in general, on the other, with a little more understanding than either is able to exercise toward the other. The reason for this is simply that, whether rightly or wrongly, the average psychologist is forced or persuaded to include in his graduate curriculum rather more of philosophy than any other scientist in training.

Etymologically the term philosophy indicates an interest in all knowledge. (So does the term science, for that matter.) To begin with, no doubt, the philosopher was simply the scholar, the learned man. Aristotle was interested in practically everything. And men very much later than Aristotle have taken or have attempted to take, the whole of human experience for their field. One thinks of Herbert Spencer, perhaps of Hegel, and some lesser men in this connection. But except in the cases of the contributions of a very few gigantic men such spreading out of interest has resulted in a thinning of the product so as to make it all but valueless. I have no intention of applying this judgment to the product of philosophy in general. But I do think that the escape from such a situation is often somewhat narrow, and that there is escape at all is due to the fact that philosophy has for many days practically abandoned all attempt to be interested in knowledge in general. No one would dream of going to philosophy to-day for answers to questions of any kind in science, or indeed, to obtain detailed information of any kind, except, perhaps, in the fields of historic folk ethic, or in the history of thought. It is possibly a little hard to realize that the day is not so very long past in which the seeker for knowledge in any field of learning would go, as a matter of course, to the philosopher. In other words the philosopher has comparatively lately ceased to be a treasury of all learning.

It is of passing interest that many of the earliest philosophers were chiefly interested in physics. I refer, of course, to the Greek atomists. Some interest in astronomy was evident at about the same time, and also in physiology of an exceedingly rude type. These interests were treated in their relation to each other, but chiefly in their relation or supposed relation to theology. Specialization was not thought of. But the history of thought shows us that from time to time men whose interest was centered, rather than scattered, split off from the main group, no longer called themselves philosophers and abandoned the philosophical method. The influence of the church was exerted to its utmost to retard this process, being interested as it was not at all in the subject, but only in their real or assumed relation to religion, or rather, to theology. And for this and other reasons, but chiefly for this, it is really late in the history of civilization before physics, chemistry, astronomy, geology and biology were able to constitute themselves as independent lines of human activity, to pursue investigations along lines suggested by their several special interests, and to build up their own bodies of knowledge by using all the ways and means that their initiative and individuality suggested, or at least all that church and government regulation allowed them to use. But such separation always resulted in lasting benefit to all concerned, except possibly certain priest-philosophers, whose individual opinions may have been outraged.

The last of the children of philosophy to leave the parental home is psychology. In fact she is at present just in the act of setting up an establishment of her own, and still remains very much under the influence of her parent. She might be said to be a spoiled child, and to have been too long content to have her affairs managed by her parent. But the signs of the times are indubitably to the effect that psychology *has* set up her own house, and intends to administer it herself.

Now that psychology is leaving or has left the philosophical rooftree I think it may be admitted that to philosophy the house is left somewhat desolate. Perhaps that is the reason why there has been some persistent objection on the part of the parent to the daughter's leaving. But, however that may be, the situation is such that the question becomes pertinent, "What is the proper field of philosophy?" While that question is pertinent my attempting to answer it would be impertinent, and I do not intend to so attempt. I have not the necessary training, whatever that may be, nor is it my place, nor is it my interest to answer it. But answered it must be, by some one, before very long. A smaller question is included in the larger, that of the relation of philosophy to the sciences which it has engendered. It is to that question that my remarks here are directed, but even it I do not expect to answer in full.

To begin with, let me emphasize the fact that the various special sciences which have left the philosophical fold, have not thereby ceased philosophizing. There has been much very significant philosophizing done within the various scientific fields and most of it has been done by men who would be apt to object if they were to be termed philosophers. They would insist that they had not philosophized. But like Monsieur Jourdain and his prose these men have been talking philosophy without knowing it. For instance, in biology the mechanistic vitalistic controversy is in its very nature intensely philosophic, but the worth-while contributions to the discussion are, in an overwhelming majority of cases, made by men not ordinarily listed as philosophers. There are exceptions, some valuable contributions have been made by soi-disant philosophers, but these are true exceptions. I can fancy that many men occupying teaching positions in philosophy have wished that they could take a forceful, not to say creditable, part in this discussion. But, alas, it is necessary if one would enter such a controversy that one possess a good deal of technical knowledge of the facts involved, rather more than is in the possession of many philosophers. In physics or physical chemistry the question as to the nature of the atom or that concerning the nature of ether may be properly referred to as philosophical. But few self-styled philosophers have any remarks whatsoever to make on these subjects. In general, it must be recognized that the division between philosophy and science is not a line between those who speculate, who are interested in abstract questions, and those who are not. The difference is of another order.

As far as the facts in the present situation in the world of thought go, the salient difference is in the breadth of interest. The scientist is one whose interests are strictly limited, the philosopher hates to recognize any limits to his field. The scientist is ambitious to go very deep in a narrow shaft, the philosopher spreads his efforts widely. Each attitude has its perfectly obvious dangers.

These two attitudes are so very different that each of them is almost, if not quite, unintelligible to the other. Few scientists are apt to quite understand just what the philosopher is trying to get at, few philosophers really appreciate what the scientist is trying to do. This mutual misunderstanding of the purpose and value of each other's work is only on the surface, and is only a significant symptom of some much deeper differentiation. For below that matter of the breadth of interest there is a deeper and more vital difference between philosophy and science which I wish to suggest in this paper.

I think there is small doubt but that there are really two very different functions of intelligence, two very different kinds of men engaged in intellectual work.

Men who are interested in knowing are either more interested in discovery, in fact, finding, than they are in systematizing their discoveries, *or* they are more interested in systematizing the facts that have been brought to their attention in whatever way than they are in fact, finding. It is a matter accessible to observation that few men are equally interested in both attitudes. If an ordinary man attempts to do both these kinds of work he will seldom be equally successful in both fields. He may excel in one, and be woefully weak in the other. I hazard the opinion that if a man excel in one of these attitudes, in the vast majority of cases he will be very far from excelling in the other. Only mediocre men, or, on the other hand, only very great men are able to work equally well in both. Of course it should be said in passing that this division of the activities of intellectual men is by no means an original observation on my part. Herbart, among others, has made the same statement, using other terms than those in which I have chosen to describe the two attitudes.

The discovering or fact-finding attitude is precisely what the name indicates, a passion for ascertaining shapes, sizes and incidence of phenomena. It delights to find variations, to uncover new and hitherto unrecognized data. Its method is particular, minute. Its reward is a large or small heap of things discovered. Men with this attitude are the pioneers, not, be it noted, the map-makers. They first make the trails, sometimes in haphazard, if not in accidental fashion. They are men whose preeminent virtue it is to *see* well, and in some fashion or other to record what they see.

The systematizing attitude is interested less in minute and detailed facts than in their arrangements, their relations, their patterns. To find, not a new fact, but a new law, is their delight. It is related of Clerk Maxwell, I think, that in boyhood he would say with regard to some natural phenomenon brought to his notice, "What I want is the particular go of it." Clerk Maxwell was probably of more significance as an organizer of facts than as a fact finder.

The economical thing is surely to recognize the difference between the two functions, and not to demand fact-finding from the systematizers, nor theorizing of great acuteness from the average discoverer. And inasmuch as both of these functions are of necessity essential to all sciences, some arrangement should be made, or recognized if already made, giving equal opportunities to the two approaches to truth. Furthermore, equal credit or reward should be apportioned to painstaking work in either field.

It takes a good deal of courage, perhaps amounting to foolhardiness, to mention names in this connection. I am not possessed of sufficient knowledge of science in general to dream of making even approximately complete lists of men in these two fields, but there are certain cases so outstanding that the mention of their names will illustrate, if it does not prove, my point.

A particularly interesting and complete example of the two attitudes is found in the labors of Tycho Brahe and John Kepler. These two great men worked practically as a team. The one, Brahe, was above all an experimenter, an observer. The other, Kepler, not only was not notable as an observer, but in fact was possessed of vision so far below normal acuteness that he was almost useless for astronomical work from the experimental end. But his contributions to astronomical knowledge were the most significant made by any man up to the time of Newton, with the possible exception of Galileo, and have been exceeded by few men of any time. To this work of Kepler's, however, Brahe made absolutely necessary contributions. Without Brahe Kepler could not have worked. Without Kepler Brahe's work would have verged on the valueless. Brahe's theories were almost grotesque, and Kepler could not have observed with great acuteness or accuracy if he had tried. The two made a perfect team, each being the other's complement to a degree seldom equalled in the history of science.

Newton's work was entirely theoretic. He did practically no fact-finding. He was a systematizer par excellence. His mighty contributions to knowledge were all in the realm of theory. He required absolutely that other men furnish him with facts. Men whose names we hardly know, and no doubt men of whom we have never heard, furnished the material from which he fashioned his laws. And without the results of the labor of these obscure or nameless workers Newton himself would have remained obscure. When as a marvellous boy he worked out the mathematical calculations which were to establish the theory of gravitation, his calculations concerning the curvature of the moon's orbit seemed to work out incorrectly. There was evidently some serious error of misapprehension. He knew it was not in his mathematics. All his work was based upon the accepted belief of the time that a degree on the earth's surface measured sixty miles. It is to me a curious thing, an amazing fact, that under these circumstances he made no attempt as far as I know to substantiate this measurement. Instead he laid his figures aside for sixteen years. Then a lesser man than Newton experimentally determined that this estimate of the length of the degree was incorrect by nearly ten miles. Whereupon Newton returned to the long-neglected and almost forgotten calculations, and found that in the light of this new experimental fact they were completely adequate. And so he gave the world the theory of gravity and inverse squares. As a fact-finder Newton was not eminent, as an arranger and explainer of facts he was unapproachable.

Clerk Maxwell, Willard Gibbs, Arrhenius! Do these names suggest to you facts or theories? The latter only. I think none of these men did any discovering. But they practised wizardry in the realm of law.

There are equally notable examples of men who have discovered much, but have theorized little, or at least only in unsatisfactory terms. Such men are a little harder than the others to name, because history has valued them less than the others, and many of them, no doubt, have been forgotten.

I have already mentioned Brahe, a shining example. In the realm of biology we find Mendel. Perhaps his work is not entirely characteristic, but at least it is true that he hardly recognized the overwhelming value of his observations. Rowland, the physicist, was essentially a fact-finder, Edison and Marconi come in the same group. Add to these a hundred thousand obscure laborers in the laboratory and in nature, essential men doing absolutely essential work if science is to progress.

A few names are great in both lines, Darwin, Helmholtz, Cuvier, Bovari.

These instances, all too few and briefly put, serve perhaps to illustrate the point I wish to make. Not all men are interested in nor *fit for* experimental work, discovery, fact-finding. Not all men are capable of theorizing in permanent terms. Very few men can do both. The theorizers are the philosophers. But why do they not, or can they not, also observe? The reason is perfectly obvious. Philosophy is not a subject. It is a method. The philosopher is not fundamentally different from the scientist because his interests are broader, but because his methods are different. The two methods require very different mental attitudes and aptitudes. I think it can be put in other words by saying that there is no such thing as philosophy *per se*. Philosophy must be philosophy "of" something, of physics, of chemistry, of biology, of religion, of behavior, and so on. And before the philosopher can work there must be something to work upon, material to be provided by the fact-finder, who must go ahead and pile up these facts to be arranged later by other hands than his.

For this reason it is that the contributions of the earlier philosophers is of little value in the light of present-day science. They had so little to work with in the way of definitely ascertained knowledge that the finest intellects and the best will in the world could have accomplished nothing. How could they observe and state the laws underlying the movements of phenomena when they did not know the phenomena? But the more or less complete failure to recognize this elementary fact has wasted much time and energy.

The place of philosophy as a college department it is presumptious for me to discuss. But is it prophesying for me to suggest that each department of science will, in time, do its own instructing in the philosophy of its own subject? Courses may be included in the offerings of each university scientific department on the philosophy of biology, of physics, of chemistry, of psychology. For the attitude of psychology toward philosophy is not different from that of any other of the sciences, except perhaps that the amount of definitely determined facts makes a comparatively small heap, and that there are some peculiarly involved philosophical problems to be handled.[1]

Beyond philosophizing in the various fields there may be a possibility of some superman relating these various philosophies to each other. For all facts of experience may, after all, be one fact, in some sense which it is impossible, even absurd to dream of now. But the man who can see and state these universal relations must do so on the basis of his knowledge of the detailed technic of all sciences. It will require a super Newton, a super Helmholtz, a greater Aristotle. But for him who can do it that will be the great task.

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[1] My friend, Dr. Dunlap, of Johns Hopkins, has suggested to me that something of the same sort may come in time to be true of history. We may come to hold that history in general is too large, or too vague a subject for one group of men to handle. And so we may some day have in each department courses in history, history of physics, of chemistry, of biology, of government, of economics, of art and literature. That would leave untreated only the history of war. And perhaps some day that may be left to the department of archeology to handle.

These remarks are not to the effect that philosophy has no relation to or place in science; quite the contrary. The value of philosophy to science depends upon the degree to which philosophy is in science, rather than above it. Science uses, or should use, philosophy as a tool, a method, for specific and limited purposes. Philosophy is the handmaid and not the mistress of the sciences. Failure to recognize the ancillary function of philosophy, attempts to enthrone it, have caused some harm to science, but much more harm to philosophy itself. To this error we may truthfully attribute the modern and regrettable belittling of philosophy.